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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Josef Pozivil

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The BOC Group, Inc.

575 MOUNTAIN AVENUE

MURRAY HILL, NJ 07974-2082

EXAMINER

BAYOU, AMENE SETEGNE

ART UNIT

PAPER NUMBER

3746

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/582,903	Applicant(s) POZIVIL ET AL.	
	Examiner AMENE S. BAYOU	Art Unit 3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>11/17/2006, 06/13/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 6-16 are rejected under 35 U.S.C 103(a) as being unpatentable over Swearingen (US patent number 3889485) in view of Blotanberg (US patent number 4362462).

3. In re claim 1 Swearingen '485 teaches process for liquefying natural gas including:

- Rotary liquefied natural gas boil-off compressor (35,12,19,20), in figure 3, having at least two compression stages (35,12) in series, a gas passage (10,11,17) passing through the series of compression stages (35,12,19,20) the gas passage (10,11,17) extending through and being in heat exchange relationship with at least one cooling means (18) between the or each pair of compression stages (between 35 and 12 or between 12 and 19), characterized in that the cooling means (18) or at least one of the cooling means is a cryogenic cooling means (even the temperature of the last stage compressed fluid exiting heat exchanger 18 which is point 22 is -230 ° F as indicated in column 7, lines 48-50. See also figure 2). Swearingen '485, however fails to teach the following limitation of claim 1 which is taught by Blotanberg '462:

There is valve means (38, 40), in figure 2 for controlling (via controller 46, 48)

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flow of coolant into the cooling means (16, 18) in response to the inlet temperature, or a related parameter, of the next compression stage (12 or 14) downstream of the cooling means (16 or 18) so as, in use, to maintain said inlet temperature at a chosen temperature, in column 4, lines 29-62.

4. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the cryogenic compressor system of Swearingen '485 by including a valve system for the inter stage intercoolers as taught by Blotanberg '462 in order to automatically monitor or adjust when needed the correct working temperature of the working fluid.

5. In re claim 2 Swearingen '485 in view of Blotanberg '462 as applied to claim 1 disclose the claimed invention:

Swearingen '485 discloses:

- The cryogenic cooling means (18) comprises an indirect cooling means (separate flow lines 18a-18d and no fluid mixing), in figure 3.

6. In re claim 3 Swearingen '485 in view of Blotanberg '462 as applied to claim 1 disclose the claimed invention:

Swearingen '485 discloses:

- The cryogenic cooling means comprises a direct cooling means (discharge from compressor 12 and flow line 10 from cryogenic cooler mix resulting heat exchange which is direct cooling means and then delivered to compressor 17 via line 17 in figure 3).

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7. In re claim 4 Swearingen '485 in view of Blotanberg '462 as applied to claim 3 disclose the claimed invention:

Swearingen '485 discloses:

- The direct cooling means (discharge from compressor 12 and flow line 10 from cryogenic cooler mix resulting heat exchange which is direct cooling means and then delivered to compressor 17 via line 17 in figure 3) comprises a chamber (the mixing chamber of line 10 and discharge of compressor 12) having an inlet (line 10 can be taken as inlet for the mixing chamber) for the introduction of a cryogenic liquid, in figure 3..

8. In re claim 6 Swearingen '485 in view of Blotanberg '462 as applied to claim 1 disclose the claimed invention:

Swearingen '485 discloses:

- There is a cryogenic cooling means (18) intermediate each pair of successive compression stages (35, 12 and 12, 17), in figure 3.

9. In re claim 7 Swearingen '485 in view of Blotanberg '462 as applied to claim 1 disclose the claimed invention:

Swearingen '485 discloses:

- There are at least three compression stages (35, 12, 17) in sequence and in that there is at least one direct cryogenic cooling means (discharge from compressor 12 and flow line 10 from cryogenic cooler mix resulting heat exchange which is direct cooling means and then delivered to compressor 17 via line 17 in figure 3) and at least one indirect cryogenic cooling means (18), in figure 3.

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10. In re claim 8 Swearingen '485 in view of Blotanberg '462 as applied to claim 7 disclose the claimed invention:

Swearingen '485 discloses:

- An inlet of a direct cooling means (which is discharge from compressor 12) communicates with an outlet of an indirect cooling means (which is line 10), in figure 3. See claim 7 for the description of the direct cooling means.

11. In re claim 9 Swearingen '485 in view of Blotanberg '462 as applied to claim 1 disclose the claimed invention:

Swearingen '485 discloses:

- There is a cryogenic cooling means (18) downstream of the final compression stage (20), in figure 3.

12. In re claim 10 Swearingen '485 in view of Blotanberg '462 as applied to claim 1 disclose the claimed invention:

Swearingen '485 discloses:

- There is a cryogenic cooling means (18) upstream of the first compression stage (12), in figure 1.

13. In re claim 11 Swearingen '485 in view of Blotanberg '462 as applied to claim 1 disclose the claimed invention:

Swearingen '485 discloses:

- The compressor (12) has an intermediate inlet communicating with a forced liquefied natural gas vaporizer (18), in figure 3. Please note that the heat

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exchanger 18 inherently vaporizes the liquefied natural gas during the process of heat exchange.

14. In re claim 12 Swearingen '485 in view of Blotanberg '462 as applied to claim 1 disclose the claimed invention:

Swearingen '485 discloses:

- A liquefied natural gas storage tank (4) having an outlet (33) for boiled-off natural gas (column 8, line 62-63) communicating with a compressor (35) the cryogenic cooling means (18) communicating with the liquefied natural gas (via line 33) in the storage tank (4), in figure 3.

15. In re claim 13 Swearingen '485 in view of Blotanberg '462 disclose a method of operating a liquefied natural gas compressor because under the principles of inherency, if a prior art device, in its normal and usual operation, would necessarily perform the method claims, then the method claimed will be considered to be anticipated by the prior art device. When the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process. *In re King*, 801 F.2d 1324, 231 MPEP 2112.02.

16. In re claim 14 Swearingen '485 in view of Blotanberg '462 disclose the claimed invention except mentioning that the inlet temperature range for each compressor stage is minus 50 to minus 140.degree.C. It would have been obvious to one having ordinary skill in the art at the time the invention was made to select the inlet temperature range for each compressor stage since it has been held that where the general conditions of a claim are disclosed in the prior art,

discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

17. In re claim 15 and 16 Swearingen '485 in view of Blotanberg '462 disclose the claimed invention except mentioning that the that the pressure ratio across each compression stage is in the range 2.15:1 to 3:1 or 2.5:1 to 3:1. It would have been obvious to one having ordinary skill in the art at the time the invention was made to select the inlet temperature range for each compressor stage because the choice merely depends on design criteria and also since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

18. Claims 5 is rejected under 35 U.S.C 103(a) as being unpatentable over Swearingen'485 in view of Blotanberg '462 as applied to claim 4 further in view of Khan et al. (reissued US patent number 33408).

19. In re claim 5 Swearingen '485 in view of Blotanberg '462 disclose the claimed invention except the following limitation which is taught by Khan et al.'408:

The outlet of the direct cooling means (74) communicates with a vessel (100) adapted to disengage particles of liquid from the natural gas, the vessel (100) having an outlet (102) for natural gas communicating with compression stage (86), in figure 2 and column 4, lines 43-45.

20. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the cryogenic compressor system of Swearingen '485

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and Blotanberg '462 by installing separator that communicates with the direct heat exchanger as taught by Khan et al.'408 in order to separate the gaseous and liquid phases.

Conclusion

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amene S. Bayou whose telephone number is 571-270-3214. The examiner can normally be reached on Monday-Thursday, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on 571-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art
Unit 3746